



King's Research Portal

DOI:

[10.1016/j.fsigen.2018.07.011](https://doi.org/10.1016/j.fsigen.2018.07.011)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Syndercombe Court, D. (2018). Forensic genealogy: Some serious concerns. *Forensic Science International: Genetics*, 36, 203-204. <https://doi.org/10.1016/j.fsigen.2018.07.011>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Accepted Manuscript

Title: Forensic genealogy: some serious concerns

Author: Denise Syndercombe Court

PII: S1872-4973(18)30369-7

DOI: <https://doi.org/10.1016/j.fsigen.2018.07.011>

Reference: FSIGEN 1930

To appear in: *Forensic Science International: Genetics*

Received date: 27-6-2018

Accepted date: 12-7-2018

Please cite this article as: Court DS, Forensic genealogy: some serious concerns, *Forensic Science International: Genetics* (2018), <https://doi.org/10.1016/j.fsigen.2018.07.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Forensic genealogy: some serious concerns

**Professor Denise Syndercombe Court, King's Forensics, Faculty of Life Sciences and Medicine,
King's College, London, UK**

Forensic genealogy: some serious concerns.

The use of genealogy to identify murderers is not new, as Chris Phillips has discussed in his accompanying piece: but the risks of false identification and intrusion into privacy is obvious to all. A false Y chromosome STR match in the case of Chen Long-Qi, for example, led to him being wrongly imprisoned in Taiwan for four years (1). As the direct-to-consumer (DTC) genomic industry has expanded significantly as a consequence of the decreasing costs of large scale SNP typing, so the industries' ability to identify close and more distant relatives within its databases has shifted the emphasis to the use of autosomal loci. Indeed, one DTC supplier, Ancestry, stopped their Y-chromosome and mitochondrial DNA typing service in 2014. Nevertheless, using this approach to uncover relatives may not be that simple if the relationship is more distant: the number of familial relationships increase exponentially so that we have almost 1000 fourth cousins and close to 5000 fifth cousins, only a proportion of whom will be on any given database. To validate the links, genealogists use powerful triangulation techniques to identify shared segments, but searching for an identity where DNA is the sole source of the information is likely to require the significant use of more traditional genealogical methods.

As forensic geneticists, we did not consider the methodology used to identify Joseph DeAngelo as being of particular concern, despite warnings from those with an interest in genomic privacy (2). We are familiar with the inherent difficulty of being able to obtain sufficient cellular material at a crime scene for analysis, though semen is perhaps a notable exception, and sexual homicides provide fertile territory for the approach used in the case of DeAngelo. The detailed linking information available in a genealogy database is, of course, private to those directly concerned, and DTC companies increasingly provide information about how they protect the privacy of the individual, although they also warn that legal processes may force them to reveal personal information. One

company actively promotes this use to the police. DTC companies are not immune to data loss problems (3) - though in the quoted case the breach did not reveal any DNA data. The Golden State Killer Investigation (GSKI) has, however, confronted us with what is almost certainly an unethical approach, in which law enforcers appear to have bypassed the codes of informed consent by submitting material for DNA analysis under a false name. While 23andMe, for example, make it clear that it is a violation of their terms of service 'for law enforcement officials to submit samples on behalf of a prisoner or someone in state custody who has been charged with a crime' (4), that does not protect against 'fishing expeditions'.

Few would argue against the forced collection of DNA from arrested individuals, especially when the crime is serious (5), and searches within a criminal database collection are done routinely because, it is argued, these individuals have forsaken their right to privacy. In contrast, no consent has been given by the contributors to a genealogical collection for their DNA to be used in a way that might implicate their relatives in a committed crime. This is true whether the data is held by one of the large DTC genetic companies or maintained by a group of individuals whose sole interest is the provision of 'analysis tools for amateur and professional researchers and genealogists' (6). Some jurisdictions will allow the testing and subsequent use of 'abandoned' DNA (as was also done in the GSKI) but it is unlikely that the information in a commercial database would be considered in that light unless the individual concerned has actively chosen to reveal their results openly to others. James Watson became the second person to publish his entire DNA sequence (7) and the Personal Genome Project (PGP) aims to recruit 100,000 individuals who have donated their genome as a public resource for research (8). This puts participants and their relatives at risk as the PGP makes clear. It is not so clear, however, whether donors to DTC companies are aware of the inherent risk. The privacy and governance of genetic collections should be at the forefront of all providers' minds, and information about both the benefits and risks to individuals should be clearly promoted, rather than buried in the small print. In 2007, the Nuffield Council reported that more than 40% of volunteers give unlimited consent for their DNA to be used in research (9); this data, although

anonymised, is subsequently monetised, at which point consent can no longer be withdrawn. The re-identification of anonymised data has already been shown to be possible and remains a current threat (10) until secure and reliable techniques of encryption become available. This could have an adverse effect on insurance provision and employment prospects both for the individual and their extended family. Withholding consent to research when a sample is provided may mean that the data is not shared with third parties, but it does not mean that a DTC company will not use the information to improve its profitability (11).

Familial searching is a 'quantum leap' (12) in forensic identification, and made even more significant today by the use of genealogical databases. Searching forensic databases has solved crimes in the UK, the US (13), and the Netherlands, in particular, but in many countries and most US States its use is currently explicitly or implicitly forbidden. At the end of 2016 only nine US States permitted familial testing and searching (14). Familial searching, or genetic proximity testing, was addressed by the European Court of Human Rights in 2008 when they argued that the 'capacity of DNA profiles to provide a means of identifying genetic relationships between individuals' interfered with the right to the private life of those individuals if such profiles were retained'. This highlights the ethical complexities of such testing (15) and the GSKI raises questions about the protection offered by the Fourth Amendment in the US in a digital age where genetic data is given or shared on a voluntary basis. Criminal DNA databases have also reinforced ideas about alleged criminality in certain families or particular demographics. It has been suggested that the use of this particular type of genealogy search might help to redress that imbalance, however, because the bulk of the stored data is held for European ancestries (16).

Consumers of DTC genealogy tests now have to confront the tension between the need to protect their own privacy and that of their close and distant relatives, and their strong desire to use this information for their own genealogical research. It is for them to choose between the two, but they need to be equipped to do so on an informed basis. The future governance of the use of such


databases for forensic purposes needs further serious thought. Erin Murphy considers that the practice will not become routine because of the amount of police effort needed to collect all of the non-genetic and genetic data (17) but the increasing power of data-mining algorithms might give the lie to that. It can also be argued that, because of the centrality of the current data collection, the approach is likely to be efficacious in the US only for crimes committed by individuals with mainly European ancestry.

The recent supposedly altruistic offer by 23andMe (18) and others of free tests to families separated at the US-Mexican border should be viewed with extreme concern. Despite their messages, genealogy companies are in business for profit and obtaining genetic information from minorities not well-represented on their databases is of significant value to them. How can we be confident about the validity of 'informed consent' given by such individuals if this policy is taken up – and how might the US Government use this data from 'illegals' in the future? We will need to negotiate an ethical boundary between individual rights and our common interests; and we will need to ensure that there are ethical voices involved in the making of decisions which are transparent, based on democratic integrity, and trusted by the public. As forensic geneticists, we must declare our concerns on international platforms so that they will be taken seriously in the future.

I would also like to thank Professor Veronika Lipphardt and her colleagues in the STR@Freiburg Initiative and Peter Aldhous, Science Journalist at BuzzFeed News, for ongoing helpful discussions on associated matters.

References

1. Taiwan Innocence Project: R v Long-Q1 Chen. (2013)
<http://twinnocenceproject.org/CaseDetail.php?CaseId=18> (accessed 23.06.18)
2. M. Naveed, E. Ayday, EW Clayton, J Fellay, CA Gunter, J-P Hubaux, BA Malin, X Wang.
Privacy in the genomic era. *ACM Comput Surv* 48 (2015) doi: 10.1145/2767007.
3. N. Rahhal (2018) Genealogy site MyHeritage hacked.
<https://www.dailymail.co.uk/.../Genealogy-site-MyHeritage-hacked-exposing-92-million-users-> (accessed 23.06.18)

4. 23andMe: Guide for Law Enforcement (2018). <https://www.23andme.com/law-enforcement-guide> (accessed 23.06.18)
5. D. Kaye. (2006) Who needs special needs? On the constitutionality of collecting DNA and other biometric data from arrestees. *Journal of Law and Medical Ethics* 34: 247-284.
6. GEDmatch. <https://www.gedmatch.com> (accessed 23.06.18)
7. James Watson's personal genome sequence. https://archive.is/20120803192155/http://jimwatsonsequence.cshl.edu/cgi-perl/gbrowse/jwsequence/?name=Sequence:NM_005516.3 (accessed 23.06.18)
8. G.M. Church. (2005). "The Personal Genome Project". *Molecular Systems Biology*. 1 (1): E1–E3. doi:10.1038/msb4100040. PMC 1681452 . PMID 16729065.
9. B. Parry. (2008) *BioSocieties* 3: 217. <https://doi.org/10.1017/S1745855208006121>. (accessed 23.06.18)
10. K. Brown. (2017) What DNA testing companies' terrifying privacy policies actually mean. <https://www.gizmodo.com.au/2017/10/what-dna-testing-companies-terrifying-privacy-policies-actually-mean/>(accessed 23.06.18)
11. D. Lazer and F.R. Bieber. (2010) 'Familial searching', its promise and perils. <http://articles.latimes.com/2010/jul/10/opinion/la-oe-lazer-grim-sleeper-dna-20100710>. (accessed 23.06.18)
12. E. Murphy. (2010) Relative doubt: familial searches of a DNA database. *Michigan Law Review*: 109, 291-348.
13. DNA Forensics. Familial Searches. Science of the future: identifying criminals through their family members. <http://www.dnaforensics.com/familialsearches.aspx>. (accessed 23.06.18)
14. J. McBride (2016). Familial DNA searches: 5 fast facts you need to know. <https://heavy.com/news/2016/12/familial-dna-searches-search-karina-vetrano-new-york-queens-father-analysis-testing-test-current-approaches-justin-christian-ohio/> (accessed 23.06.18)
15. R. Hindmarsh and B. Rrainsack (eds). *Genetic Suspects: Global Governance of Forensic DNA Profiling and Databasing*. (2010) Cambridge University Press.
16. N.Ram, C. Guerrini, A. McGuire. Genealogy databases and the future of criminal investigations. *Science* (2018) 360; 1078-9.
17. D. Starkey. Golden State killer DNA reveals major data privacy concerns (2018). <https://www.geek.com/tech/golden-state-killer-dna-search-raises-major-data-privacy-concerns-1739868/> (accessed 23.06.18)
18. T. Sanchez (2018). 23andMe donating DNA kits to help reunite migrant families. *The Mercury News*. <https://www.mercurynews.com/2018/06/21/congresswoman-jackie-speier-asks-23andme-to-reunite-families-separated-at-border/> (accessed 23.06.18)